Better Buildings®
U.S. DEPARTMENT OF ENERGY

Better Buildings Residential Network Peer Exchange Call Series

The Deep Retrofit Warranty – A Game Changer?

February 23, 2023

U.S. DEPARTMENT OF ENERGY

Agenda and Ground Rules

- Moderator
  - **Jonathan Cohen,** Better Buildings Residential Network, DOE Residential Buildings Integration Program (RBI)
- Agenda Review and Ground Rules
- Residential Network Overview and Upcoming Call Schedule
- Opening Poll
- Featured Speakers
  - **James Geppner,** New York State Energy Research and Development Authority (NYSERDA)
  - **Jeff McAulay,** Energetic Insurance
  - **Chris Richardson,** ADL Ventures
- Open Discussion
- Closing Poll and Announcements

Ground Rules:

1. **Sales of services and commercial messages are not appropriate** during Peer Exchange Calls.
2. Calls are a safe place for discussion; **please do not attribute information to individuals** on the call.

The views expressed by speakers are their own, and do not reflect those of the Dept. of Energy.

Join the Network

Member Benefits:

- Recognition in media, social media and publications
- Speaking opportunities
- Updates on latest trends
- Voluntary member initiatives
- One-on-One brainstorming conversations

Commitment:

- Members only need to provide *one number*: their organization's number of residential energy upgrades per year, or equivalent.

Upcoming Calls (2nd & 4th Thursdays):

- *3/9: What is the Buildings Upgrade Prize (Buildings UP) and How to Win Prizes and Technical Assistance*
- *3/23: Low Income Residential Energy Efficiency Best Practices – Part 1*

Peer Exchange Call summaries are posted on the Better Buildings website a few weeks after the call

James Geppner

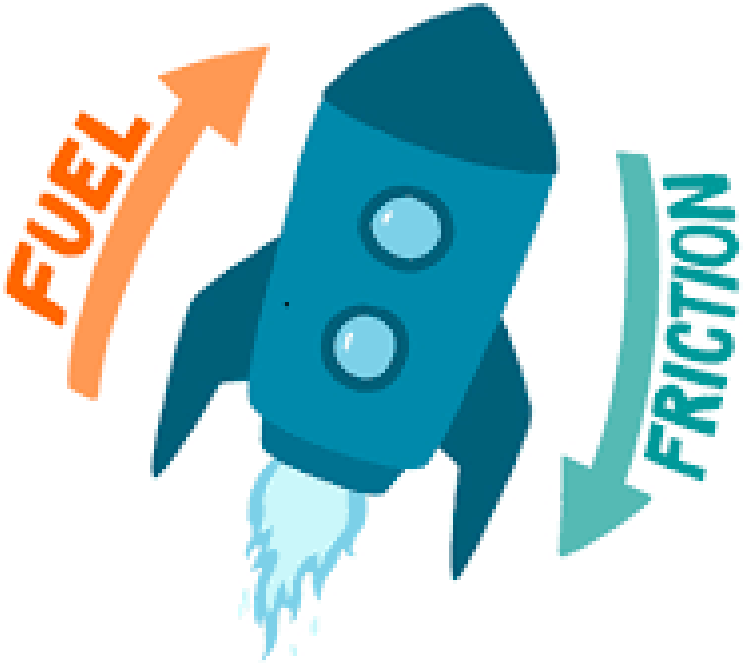
New York State Energy Research and Development Authority (NYSERDA)

Unlocking Capital For Building Decarbonization

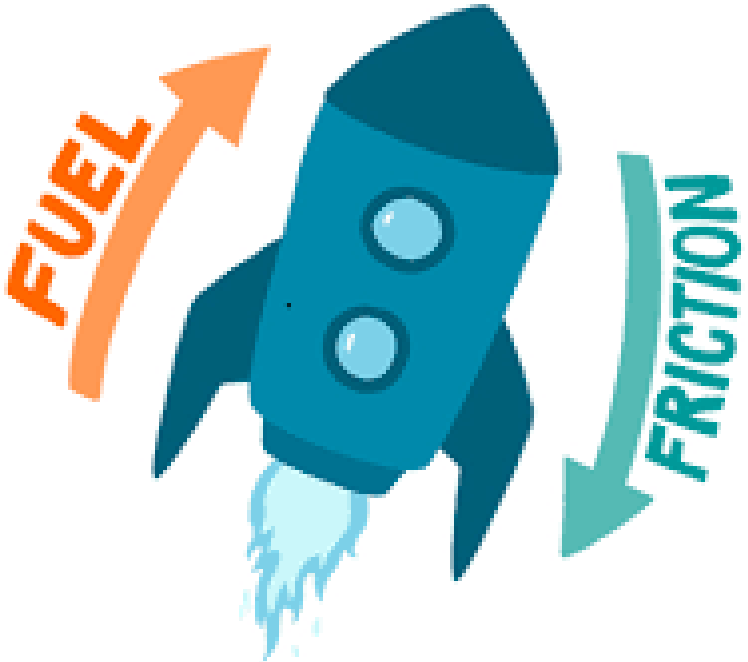
DOE Building Exchange Feb 2023

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

Anatomy Of A Behavior



Friction For Building Owners



1. Upfront capital requirements
2. Unwillingness to carry performance risk and uncertainty of outcomes
3. Long closing periods adding uncertainty to projects and adding costs
4. Lack of financial products tailored to advanced buildings

Prediction

What rate of adoption would you predict under this condition?

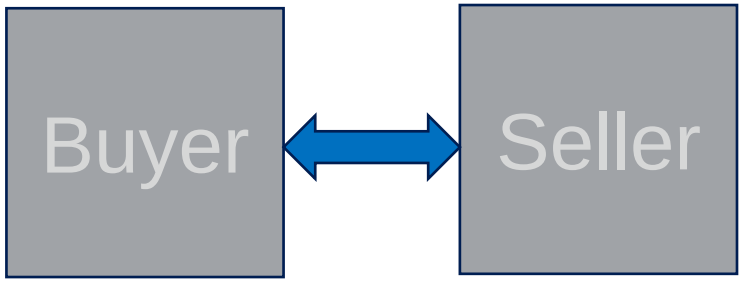
Risk Is The Cause Of This Friction

Risk

1. Upfront capital requirements
2. Unwillingness to carry performance risk and uncertainty of outcomes

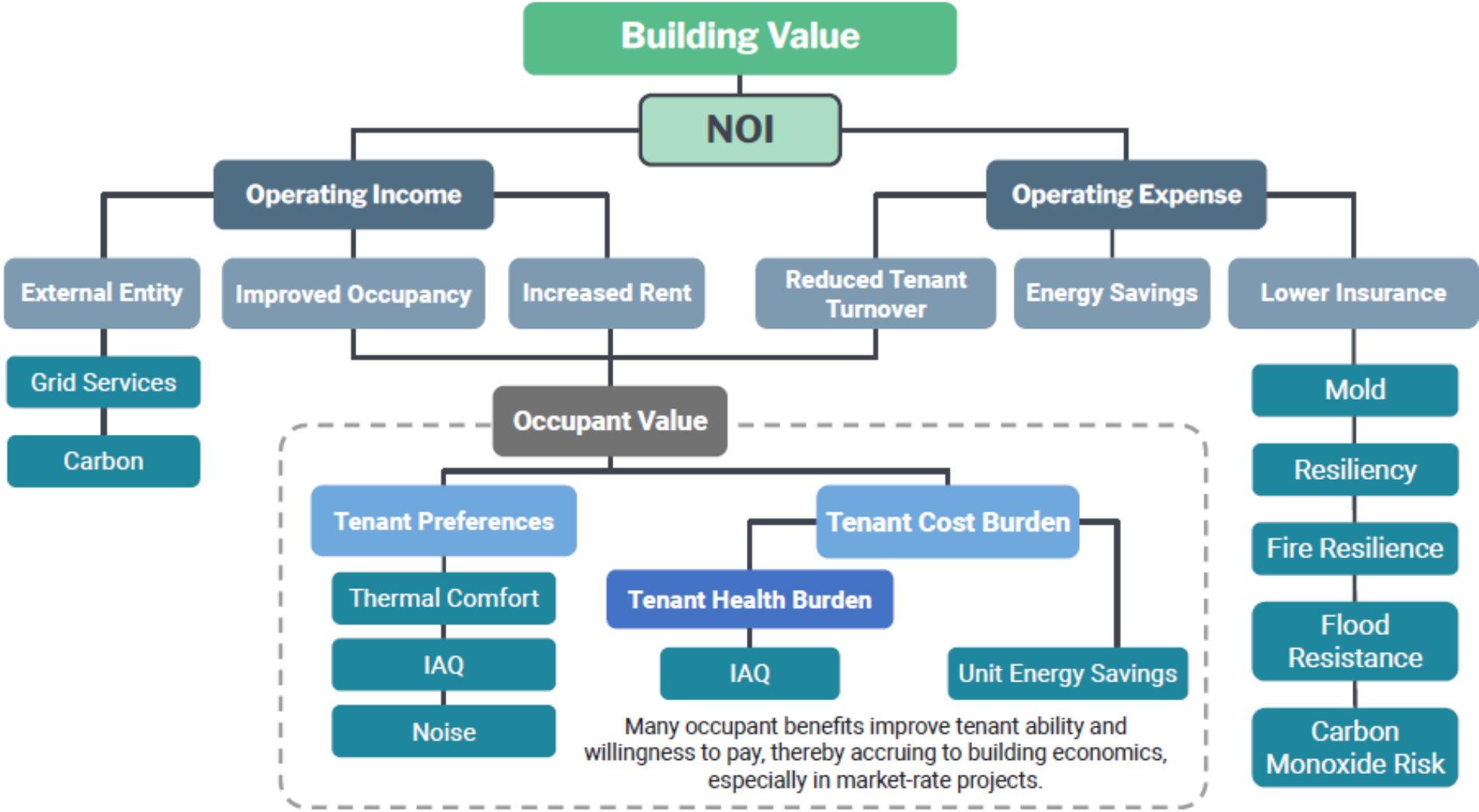
4. Lack of financial products tailored to advanced buildings

Who Carries The Risk In A Transaction?



In many well-functioning, highly liquid markets the seller assumes the risk (Apple, Amazon, FDIC).

Consider what would happen if this weren’t so.


Building Value
NOI
Operating Income
Operating Expense
External Entity
Improved Occupancy
Increased Rent
Reduced Tenant Turnover
Energy Savings
Lower Insurance
Grid Services
Carbon
Occupant Value
Mold
Resiliency
Fire Resilience
Flood Resistance
Carbon Monoxide Risk
Tenant Preferences
Tenant Cost Burden
Thermal Comfort
IAQ
Noise
Tenant Health Burden
IAQ
Unit Energy Savings
Many occupant benefits improve tenant ability and willingness to pay, thereby accruing to building economics, especially in market-rate projects.

Discounting Of Value Of Building Owner Assuming Performance Risk

The consequence of the building owner carrying performance risk are low adoption rates the discounting of value.

Lenders frequently underwrite only 25-50% of projected energy savings AND value the ten other value streams at 0. Where would the solar industry be if only 25-50% of estimated energy production was assumed during the financing?

The impact is high upfront capital requirements for the building owner.

Less Capital Available To Finance The Project

Every dollar of NOI not accounted for in the forecast can reduce the amount of debt available to finance by as much as 7 to 14 dollars. (This varies by LTV and assumed cap rate.)

Risk misallocation is expensive.

Where To Place The Risk

The holder of the risk has agency to seize on opportunities to lower the risk.

The holder of the risk can lower the concentration of risk by distributing it across a large portfolio.

The holder of the risk has expertise in valuing and managing risk.

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If there's a heat pump that operates better or an air barrier that last longer, the incentives exist to take all opportunities to eliminate or reduce risk. **Get rid of the risk if you can**.

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Get rid of the risk if you can.

The holder of the risk can lower the concentration of risk by distributing it across a large portfolio.

How many people have enough money in the bank to replace their existing car? If the owner of the car carried the risk, the only people who could afford a car would be the ones that had $47,000 in the bank. **Distribute risk to lower variability of loss.**

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The holder of the risk has expertise in valuing and managing risk.

Those without the expertise in managing risk are unlikely to price that risk appropriately or be able to minimize the cost of that risk.

Building Owner Perspective Summary

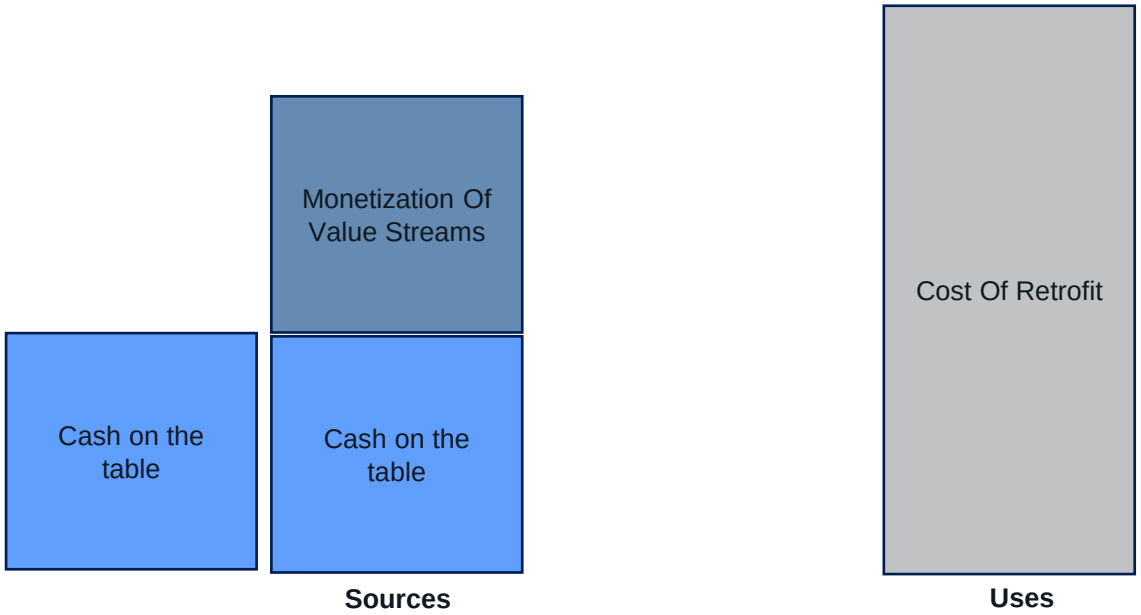
> Unable to absorb major loss (loss aversion)

> Sizing and pricing risk not a primary capability

> Don’t want to expose themselves to a low frequency/ high cost events such as system failure

Cash On The Table + New Value

Cash On The Table + New Value



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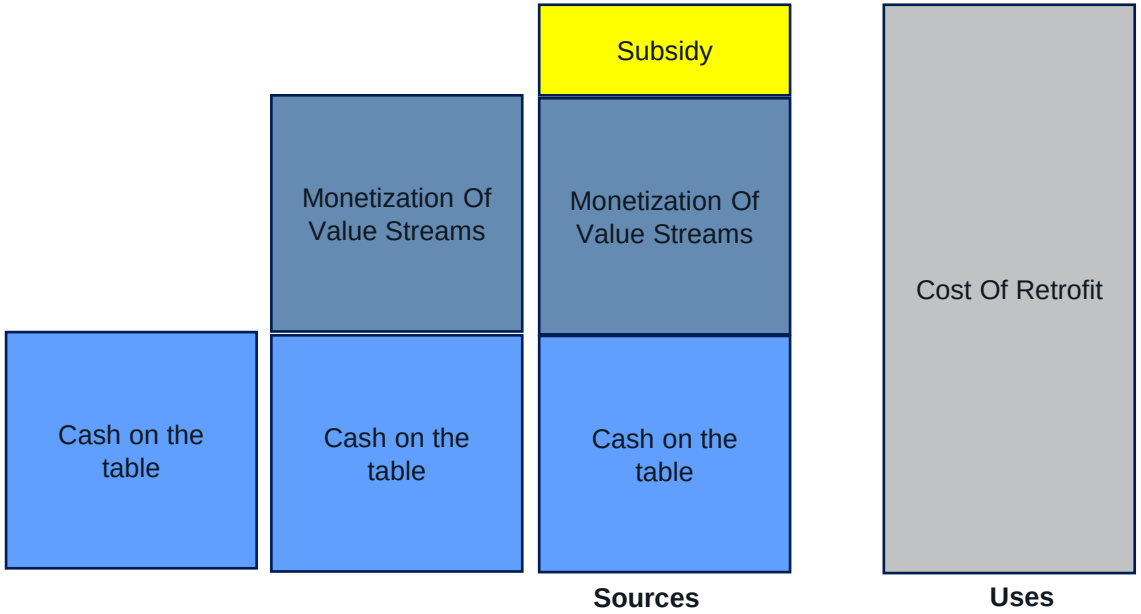
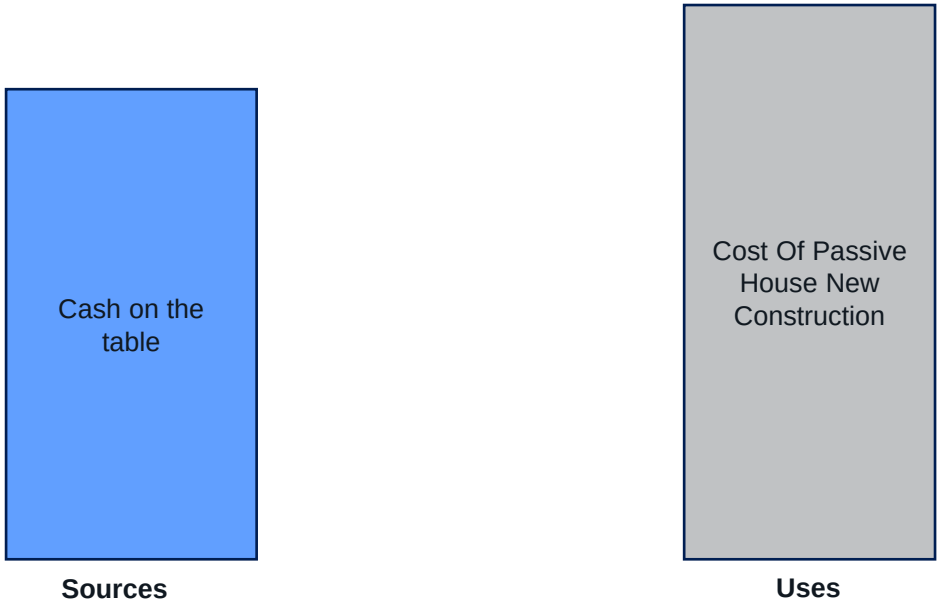


Cash On The Table + New Value (New Construction)



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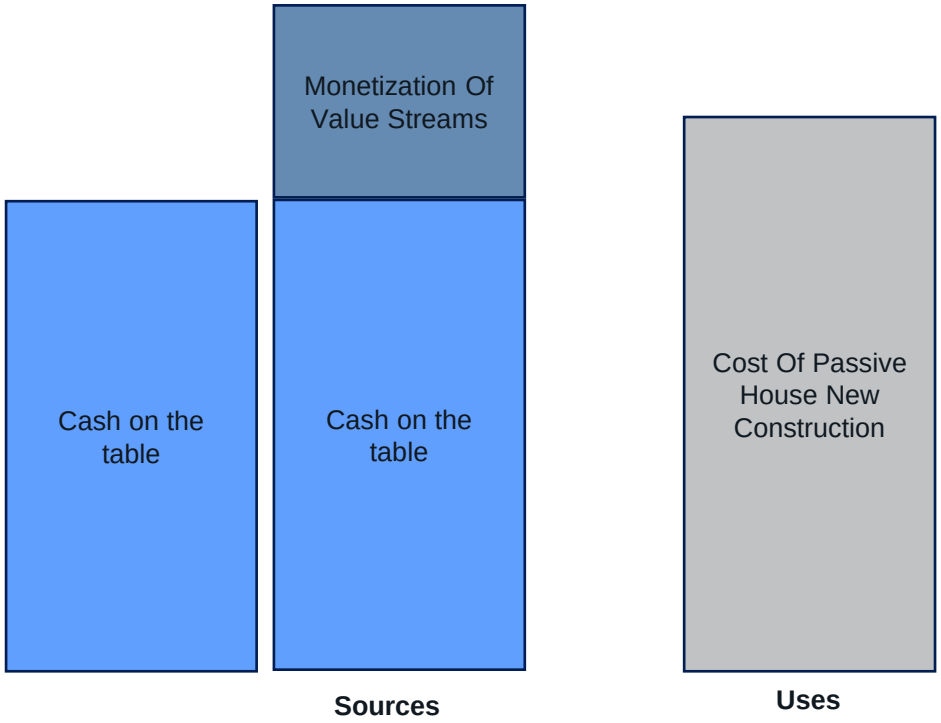


Value

For building owner. Lower upfront capital requirements. Easier to finance project. Performance risk transferred to another party.

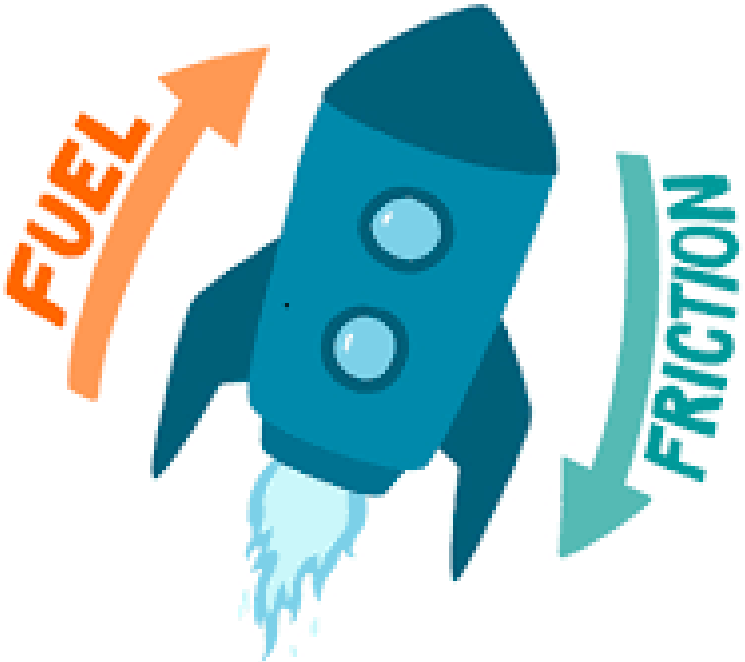
For lender. Easier to underwrite the deal. Lack of expertise in underwriting high efficiency buildings is less of a problem.

For insurer. A new business line. Reduce risk of existing lines of business such as property insurance.

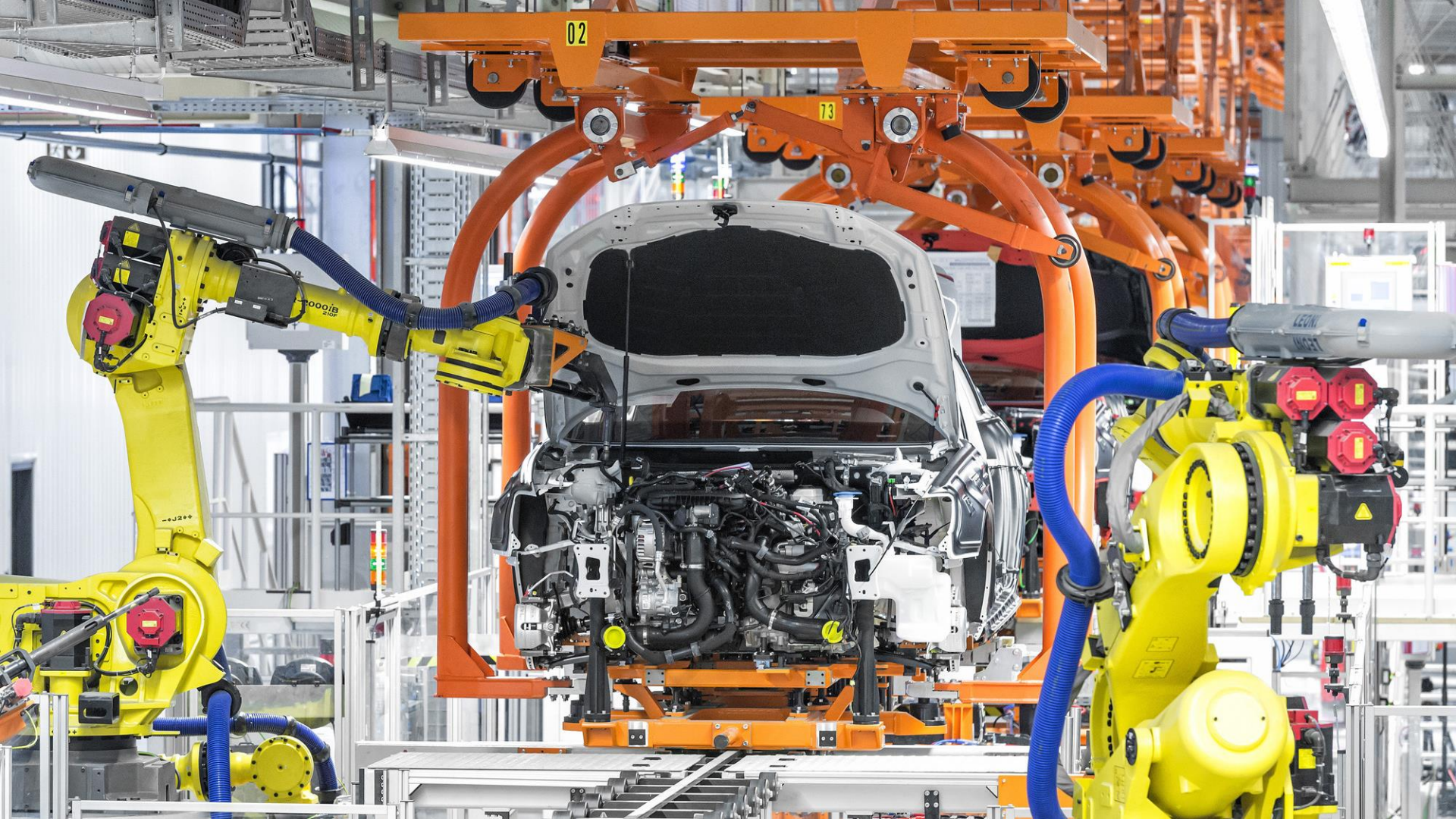
For government entities. Effective use of public funds with very high impact ratio (public to private dollars invested into market).

How Much Is Enough?

- ✓ Known outcomes
- ✓ High lifetime value of tenants
- ✓ Lower risk profile
- ✓ Access to new revenue streams
- ✓ Improved cash flows



- ✓ Financial product tailored to solution
- ✓ Lower upfront capital requirement
- ✓ Reduced uncertainty
- ✓ Easy to price value (know what you're buying)
- ✓ Standardized contracts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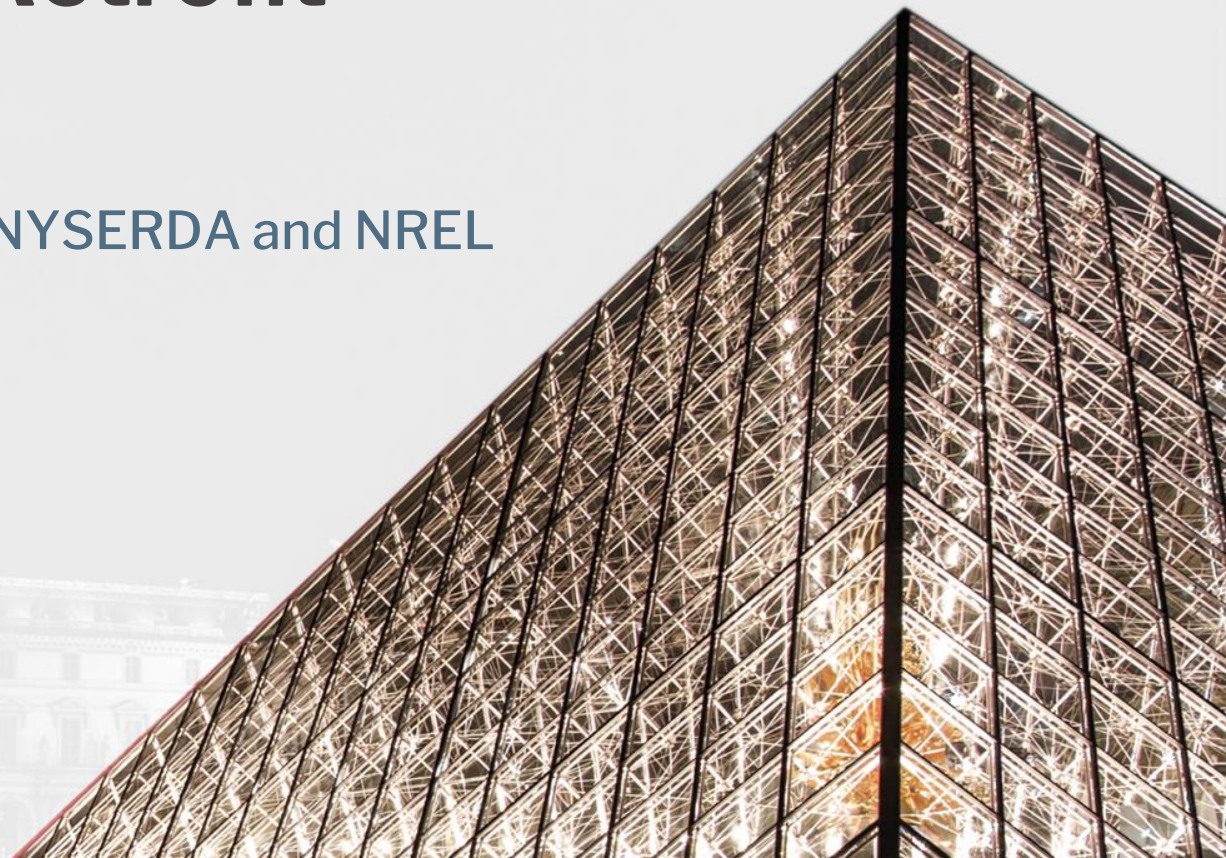
Jeff McAulay
Energetic Insurance

Chris Richardson
ADL Ventures

Deep Energy Retrofit Warranty

Study commissioned by NYSERDA and NREL



ADL VENTURES

ADL is rebuilding and energizing a clean and vibrant world

by rewriting the rules of engagement among legacy corporations, new ventures, and government

What we do

Corporates

- Build new revenue streams
- Partner with disruptive innovators
- Spin out IP into new ventures

Startups

- Fund and launch spin outs
- Accelerate startup operations
- Plan & execute BD efforts

Government

- Assist federal / state government entities
- Focus on commercialization, fundraising, operational scaling and recruitment

Where we focus

Energy & Utilities

Buildings & Construction

Transportation

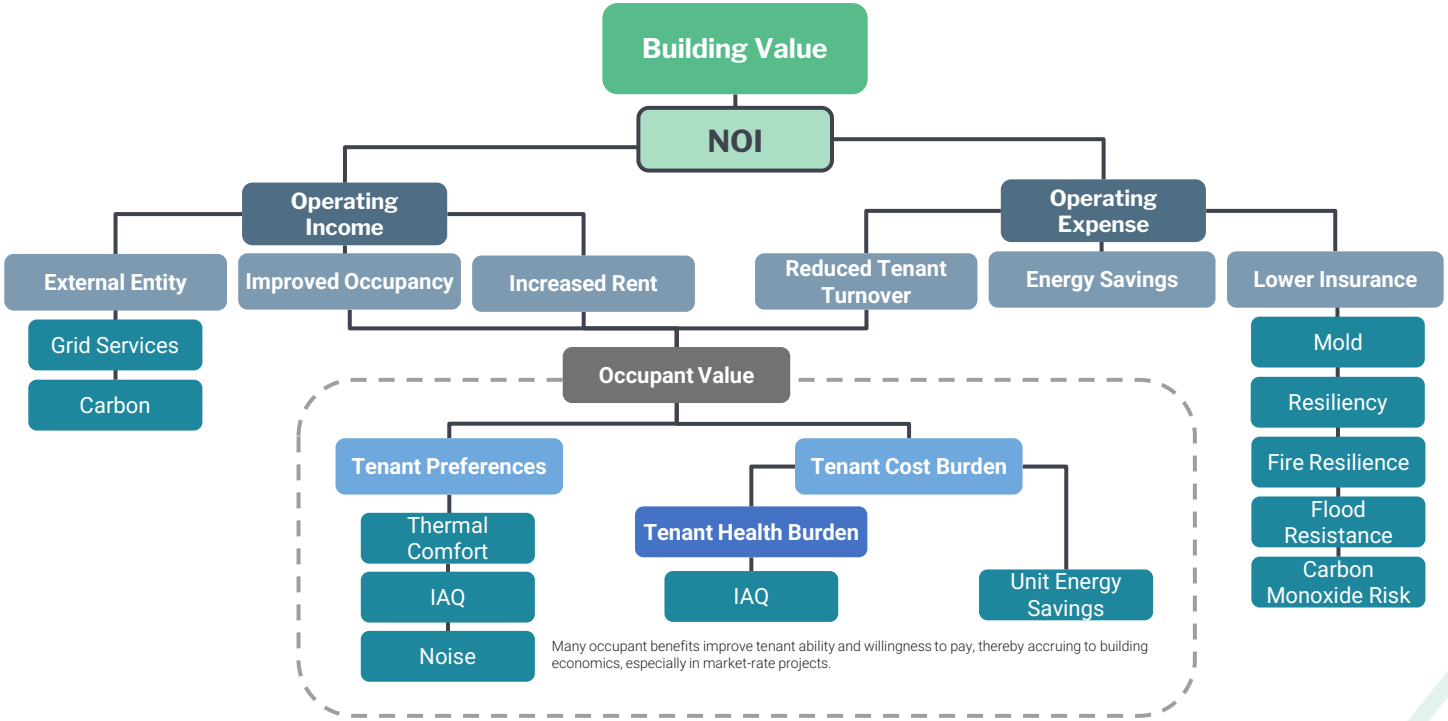
Deep Energy Retrofits are too expensive, but they are also undervalued.

Building owners may *intuitively* acknowledge all benefits, but they don't translate to an economic analysis of the building retrofit.

Some value streams are recognized (notably energy savings) but are **deeply discounted** due to uncertainty.

Other value streams are not explicitly captured today, such as…			
Rent Premium	Reduced Maintenance	Indoor Air Quality	Carbon Monoxide Risk
Energy Savings	Avoided Carbon Tax	Noise Reduction	Energy & Systems Resilience
Property Value	Grid Services	Mold & Mildew	Carbon Credits
Tenant Retention	Thermal Comfort	Fire Rating	Building Longevity
Insurance & Risk	Tenant Health Outcomes	Flood Rating	Tax Benefits

Deep energy retrofits have the potential to contribute through these value streams to Net Operating Income (NOI)



For a representative building in NYC, NOI could increase by a base case of 15-20% as a result of a Deep Energy Retrofit

Energy savings alone would only yield a **5% improvement in NOI,** making it difficult to finance a deep energy retrofit

This could unlock between *$1.0 and $2.8 million* in additional financing for a typical multifamily building, accounting for 20-50% of the cost gap projects are currently facing

Net Operating Income Effects by Value Stream

	NPV Years 1 - 10 Base Case	% Delta to Baseline NOI Base Case	% Retrofit Cost Base Case
Net Operating Income – Pre-Retrofit	$6,478,802		
Increased Occupancy Impact	$150,772	2.3%	3%
Maintenance Expense Impact	$142,600	2.2%	3%
Rent Premium Impact	$422,355	6.5%	8%
Energy Savings Impact with Instrument	$344,778	5.3%	7%
Local Law 97 Impact	$52,767	0.8%	1%
Turnover Expense Impact	$12,270	0.2%	0%
Grid Services Impact	$0	0.0%	0%
Insurance Savings Impact	$15,640	0.2%	0%
Avoided Emissions Revenue Impact	$19,387	0.3%	0%

What would make building owners and financiers consider the **full value of retrofits** when financing a deep energy retrofit?

- → Re-allocation of risk from risk-averse parties to insurers that can more effectively model, price, and spread risk
- → Quantifying and monetizing previously unrecognized value streams associated with advanced envelop deep energy retrofits

For building owners, an insurance instrument could:

Lower upfront capital requirements for building owners through an increase in the availability of debt financing

Reduce uncertainty around financial projections

Transfer technology risks from the building owner to an insurance company

Three financial products could make it easier to finance deep energy retrofits:

1. Building System Performance Guarantee
2. Trade Credit Insurance Based on Building Creditworthiness
3. Ancillary Revenue Contracts

Building System Performance & Energy Savings Guarantee

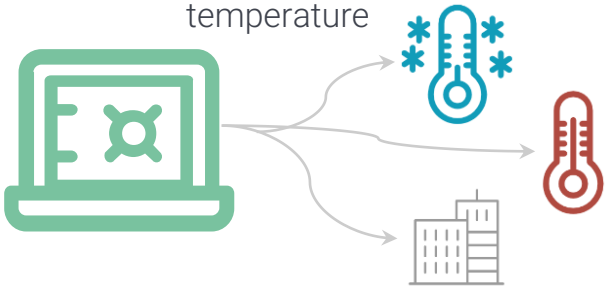
Problem Space

Current “repair, replace, or refund” warranties for 5 years give **insufficient assurance** to building owners that they will not incur high product maintenance, repair or replacement costs within the expected lifetime of the equipment.

With new integrated systems, building owners are concerned that **energy savings and other areas of performance will not be delivered**

Solution Space

Energy savings guarantee products that add coverage for **measurable performance elements** such as failing to maintain temperature



Trade Credit Insurance based on Net Operating Income (NOI)

Problem Space

Many benefits of retrofits accrue to tenants, which drives improvements in building revenues, however these benefits are difficult to model.

This limits building owners' ability to attain financing.

Solution Space

Insure against project default, based on portfolio level improvements in retrofit NOI & creditworthiness.

Reduce repayment uncertainty to lenders, thus unlocking more capital per project

How does a credit product work?

The lender simply wants to know **it will get its money back** for the project.

- Credit insurance is based on the **ability to pay off debt**.
  - NOI (cash flow) is the key driver of the ability to pay off debt.
- A credit product **doesn't guarantee NOI** for the building owner but rather insures against insolvency at the project level.

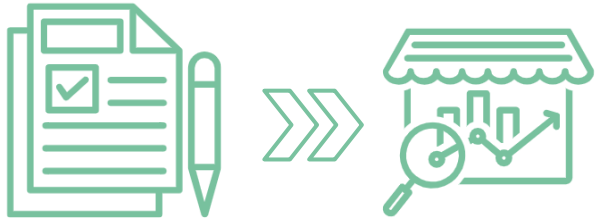
Ancillary Revenue Contracts

Problem Space

Grid services and carbon credits will have increasing value over time, but there can be a principal-agent problem that makes monetization more difficult

Solution Space

Separable bilateral and long-term contracts to provide certainty in a volatile market



What's needed from here?

An insurance company that is comfortable with commercial real estate and the risks related to retrofits

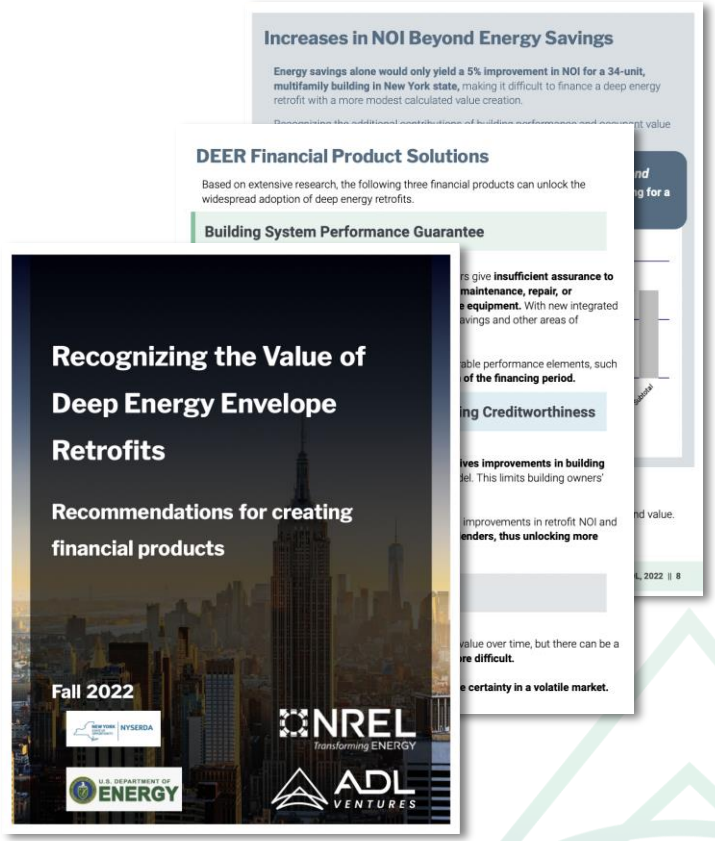
A lift from government to get the product started:

- Demand aggregation (e.g. developers of affordable housing)
- Standard Development
- Product Development Support
- Loan-loss reserve (first-loss risk capital)

Coming Soon

ADL Ventures, alongside the DOE and NREL, are publishing an executive summary report on recommended actions for policy makers, insurers, and building owners to unlock the widespread adoption of deep energy retrofits.

Today's session was a preliminary look into our analysis of viable financial product solutions. Stay tuned for the official report this Fall.



Discussion Questions

1. What other value streams or soft benefits are not accounted for in financial analysis' for deep energy retrofits?
2. Who would be likely to adopt these products?
    a. Building type, geography, etc
3. What can be done to realize their value?
4. Do you have any data or anecdotal evidence for moving markets with supporting financial or risk products?

Thank You


APRIL
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U.S. DEPARTMENT OF ENERGY

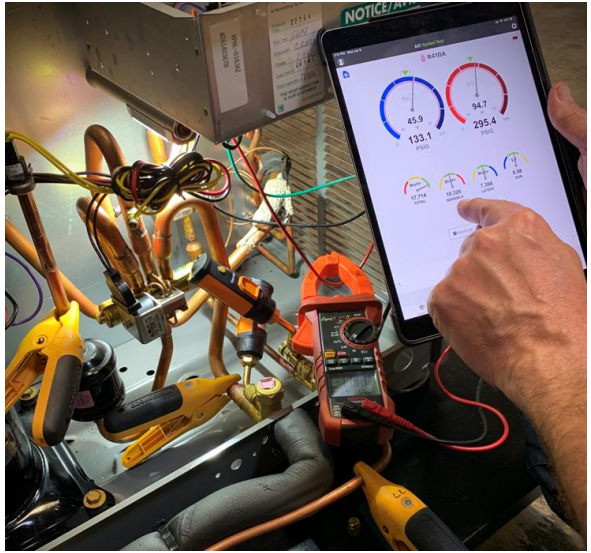
Heat Pumps, an Asterisk, and a Solution

Q: How do we decarbonize residential heating loads?

A: Heat Pumps*

*Improper installations reduce system performance, resulting in energy waste and comfort issues:

- One or more energy-wasting HVAC fault in 70–90% of homes[1]
- Estimated 9% residential HVAC energy waste nationally due to installation faults in CAC/ASHP[2]



Solution: Smart diagnostic tools help ensure heat pumps are installed properly, resulting in realized energy-efficiency and reduced energy waste.

1. EERE, 2019. Residential HVAC Installation Practices: A Review of Research Findings
2. Winkler et al. 2020. Impact of installation faults in air conditioners and heat pumps in single-family homes on U.S. energy usage. Applied Energy, Volume 278

Smart Tools for Efficient HVAC Performance (STEP) Campaign

Pacific Northwest NATIONAL LABORATORY

STEP CAMPAIGN

Scan this QR code to visit our website

Contact: christian.victoria@pnnl.gov

The STEP Campaign aims to increase adoption of smart diagnostic tools to streamline HVAC system performance testing and troubleshooting, reducing energy-wasting faults and improving occupant comfort.

To join the STEP Campaign, visit: bit.ly/3DFmEaE

HVAC Contractors and Technicians

- Reduce callbacks, improve consistency and quality, streamline processes
- Find out where to get training on smart diagnostic tools
- Be recognized for successful adoption of smart diagnostic tools!

Utilities and Program Implementers

- Streamline quality installation and quality maintenance programs
- Improve engagement with your contractors
- Be recognized for programs that utilize smart diagnostic tools!

HVAC Training Organizations

- Offer qualified training on System Performance with smart diagnostic tools
- Promote your training events
- Be recognized for providing training!

Weatherization Organizations

- Ensure your ASHP/CAC installations are operating at optimized efficiency
- Develop pilot with PNNL team
- Be recognized!

ORGANIZING PARTNERS

ACCA · BUILDING PERFORMANCE ASSOCIATION · CEE Working Together, Advancing Efficiency · HVAC Excellence · NATE · neea · U.S. DEPARTMENT OF ENERGY

Storm Window and Insulating Panel (SWIP) Campaign

Scan this QR code to visit our website

Contact: christian.taboria@pnnl.gov

Residential Storm Window and Insulating Panel Virtual Summit
March 9, 2023 (3-5pm EST)

Gain insights from utilities and weatherization organizations that have included cost-effective and energy-rated storm windows and insulating panels in their programs.

Register for the SWIP Summit:
http://bit.ly/3Y1WQOb

Buildings UP

The Buildings Upgrade Prize

AMERICAN MADE
U.S. DEPARTMENT OF ENERGY

Building capacity to transform U.S. buildings into energy-efficient and clean energy-ready homes, commercial spaces, and communities

Upgrading existing buildings to efficiently run on clean energy will help address climate change. This means transitioning **residential and commercial buildings** to efficient electric equipment, such as **heat pumps and heat pump water heaters**, and ensuring comfort with measures such as **insulation and air sealing**.

Teams participating in **Buildings UP** will develop innovative plans to leverage the billions of dollars through the Bipartisan Infrastructure Law, the Inflation Reduction Act, utility rebate programs, and many other funding sources available and capitalize on this unprecedented opportunity to improve our homes, businesses, and communities.

Buildings UP will award more than **$22 million** in cash prizes and expert technical assistance to bring winning ideas to life.

www.heroX.com/buildingsUP

Form Your Team and Submit Your Application by July 2023!

- Community-based organizations
- Local governments
- Utilities
- Non-profit organizations
- For-profit energy efficiency companies
- and more!

Multi-stakeholder teams are encouraged

Application support available for new and under-resourced teams

Follow Buildings UP on HeroX for prize info and updates
Questions: buildingsUP@nrel.gov

Explore the Residential Program Guide

Resources to help improve your program and reach energy efficiency targets:

- Handbooks - explain *why* and *how* to implement specific stages of a program.
- Quick Answers - provide answers and resources for common questions.
- Proven Practices posts - include lessons learned, examples, and helpful tips from successful programs.
- Technology Solutions NEW! - present resources on advanced technologies, **HVAC** & **Heat Pump Water Heaters**, including installation guidance, marketing strategies, & potential savings.
- Health + Home Performance Infographic NEW! – spark homeowner conversations.

https://rpsc.energy.gov

Health + Home Performance Infographic

DOE's new Health + Home Performance Infographic reveals the link between efficiency and health – something everyone cares about. Efficiency programs and contractors can use the question-and-answer format to discover a homeowner's needs.

The infographic is ideal for the "kitchen table" conversations where people decide what to do – and who they want to do it. It also has links for homeowners to find a qualified contractor if they do not already have one.

Download this infographic from DOE's Better Buildings Residential Network.

Looking for photos to help tell your energy efficiency story? Visit our image libraries: https://www.energy.gov/eere/better-buildings-residential-network/articles/image-libraries

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Please send any follow-up questions or future call topic ideas to:
bbresidentialnetwork@ee.doe.gov